Courtney Burn 53358782

Research proposal

Can fish of the Southern ocean handle climate change?

Trematomus bernacchii metabolic response to acute temperature change after a year in captivity

Outline - *Trematomus bernacchii* is a notothenioid fish found in the Southern Ocean (Davison et al. 1994). The Southern ocean is typically -1.8°c all year round and is one of the most temperature sensitive environments (Davison et al. 1995, Davison et al. 1994). Due to the harsh cold environment that is the Southern ocean many organisms living within this habitat are specially adapted to thrive in such environments. *T. bernacchii* is no exception to this. *T. bernacchii* is known to show metabolic compensation, this involves *T. bernacchii* increasing its standard metabolic rate to counteract the Q^{10} effect in place due to the low temperatures of the water (Somero et al. 1968).

Warming of the Southern ocean and the continent of Antarctica has been observed within the past decade (Aggrio & Thomas 2004, Clarke et al. 2007). If this warming continues it could pose a great threat to physiologically specialised organisms within these cool areas. Most organisms which are highly physiologically specialised lack the plasticity to adapt to changing environments (Wilson et al. 2001). This could lead to potential problems for *T. bernacchii*

Problem - Due to its high physiological specialisation *T. bernacchii* is unlikely to tolerate temperature changes as well as temperate counterparts can. *T. bernacchii* shows temperature dependent swimming rates, any long term exposure to high temperatures will affect the ability of *T. bernacchiiI* to swim normally (Wilson et al. 2001)

Past research has looked at changes in oxygen consumption using respiration as a measure when *T. bernacchii* was exposed to acute temperature changes. My project will revisit this topic and look into the effects that a year of captivity may have on metabolic rate changes.

Aim – The aim of this project is to produce a scientific report on *T. bernacchii* ability to tolerate acute temperature changes and to investigate into the effects of captivity on these fish.

Key questions – What changes occurs to oxygen consumption of *T. bernacchii* when exposed to acute changes in temperature? Has a year of captivity affected *T. bernacchii* ability to tolerate acute temperature change?

Methodology – A respirometer set up to powerlab and an oxygen electrode will be used to measure oxygen consumption. One fish will be placed in a respirometer and be left to de-stress for a while. Once the fish has de-stressed oxygen consumption will be continuously recorded over a few different acute temperature changes ranging from -2°c to 6°c.

References

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